Grade 5
Mathematics
Item Specifications

Missouri
DEPARTMENT OF ELEMENTARY & SECONDARY
EDUCATION

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Introduction

In 2014 Missouri legislators passed House Bill 1490, mandating the development of the Missouri Learning Expectations. In April of 2016, these Missouri Learning Expectations were adopted by the State Board of Education. Groups of Missouri educators from across the state collaborated to create the documents necessary to support the implementation of these expectations.

One of the documents developed is the item specification document, which includes all Missouri grade level/course expectations arranged by domains/strands. It defines what could be measured on a variety of assessments. The document serves as the foundation of the assessment development process.

Although teachers may use this document to provide clarity to the expectations, these specifications are intended for summative, benchmark, and large-scale assessment purposes.

Components of the item specifications include:

Expectation Unwrapped breaks down a list of clearly delineated content and skills the students are expected to know and be able to do upon mastery of the Expectation.

Depth of Knowledge (DOK) Ceiling indicates the highest level of cognitive complexity that would typically be assessed on a large scale assessment. The DOK ceiling is not intended to limit the complexity one might reach in classroom instruction.

Item Format indicates the types of items used in large scale assessment. For each expectation, the item format specifies the type best suited for that particular expectation.

Text Types suggests a broad list of text types for both literary and informational expectations. This list is not intended to be all inclusive: other text types may be used in the classroom setting. The expectations were written in grade level bands; for this reason, the progression of the expectations relies upon increasing levels of quantitative and qualitative text complexities.

Content Limits/Assessment Boundaries are parameters that item writers should consider when developing a large scale assessment. For example, some expectations should not be assessed on a large scale assessment but are better suited for local assessment.

Sample stems are examples that address the specific elements of each expectation and address varying DOK levels. The sample stems provided in this document are in no way intended to limit the depth and breadth of possible item stems. The expectation should be assessed in a variety of ways.

Grade 5 Mathematics

Frequently asked questions for Item Specification and Sample Stems

1. What is the purpose of the Item Specification document?
Historically, Item Specification documents are written for test item writers. In Missouri, this document was seen as a resource for not only item writers, but teachers as well. The unwrapped section should provide more detail on the meaning of the standard and the sample stems should provide example items that also help clarify the standard. In this update, the language used in the Expanded Expectations document was included to merge the two documents for easier access. In some standards a "Notes" section was added to provide additional information.

2. Why do some unwrapped sections have the same few sentences at the beginning?
For standards that have multiple parts and are listed as sub expectations, e.g., NF.C.5.b, the first part highlights the intent of that standard series. Often, these standards should be taught together as they develop a bigger idea or concept.

3. Why is the Fluency definition only on some standards?
Certainly, students having experience using different strategies and picking the strategy they feel best for given situations is important to improving student knowledge in mathematics. The Missouri Educators working on the document felt it important to highlight areas where student access to multiple strategies would provide the greatest support. Listing fluency in all standards would likely lessen the impact needed.

4. What does the "e.g." mean when listed in the unwrapped section?
The "e.g." is a way to highlight a list of examples, ideas, or concepts. It is **not** an exhaustive list, nor is it intended to represent the best examples. It is merely a partial list to provide some examples.

5. What does "with or without context" mean?
This phrase was used to highlight that the math problems might have some situational context or could possibly be a strictly number or symbol situation. The Educators working on this update wanted the focus to be on using math to solve problem situations rather than a focus on "real world" problems.

6. Are the Sample Stems examples of summative test items?
The Sample Stems could be a classroom item or possibly an assessment item. In some cases, the problem used would have to be adjusted to use on a Statewide assessment. The goal was to give students and teachers a problem that aligns to the standard. The Stems provided in the document are an example. The educators assisting with the update in some cases created more than one example and those are listed at the bottom of the document. All examples are good, some fit better on the page within the Item Specification which have determined those shown in both places.

7. Why are there no answers listed with the Sample Stems?
The focus of the Sample Stems should be on the work students can demonstrate to indicate their level of understanding for the given standard. While the answer is one component, when given, it frequently becomes the focus which does not provide important information in the learning process.

8. What does "No Limits" mean in the Limits and Boundaries section?
Where there are no limits or boundaries to be listed, "No Limits" was used to indicate this situation and help those using the document understand that it wasn't an oversight. IMPORTANT NOTE: if the standard itself or the cluster heading lists a specific limit, e.g., specific denominators, size or type of number, that was not duplicated in the Limits section.

9. Why do some words show a short definition?
While this does not serve as a replacement for a glossary, there were terms within the unwrapping that the committee felt should have meaning included. This occurs in the standard where it specifically addresses the concept in the standard, e.g., cardinality, trapezoid.

10. Why are Kindergarten and Grade 1 Sample Stems a bit different?
Students in Kindergarten and Grade 1 are beginning readers, so teachers should expect to read problems to the students rather than only providing problems to be solved.

Grade 5 Mathematics

Mathematics	5.NBT.A.1
NBT A 1	**Number Sense and Operations in Base Ten** **Use place value system understanding to perform operations with multi-digit whole numbers to billions and decimals to thousandths.** Read, write and identify numbers from billions to thousandths using number names, base ten numerals and expanded form.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will read, write, and identify numbers from billions to thousandths using base ten numerals, number names, and expanded form.

Note:
Expanded form is not the same as **expanded notation**, e.g., **expanded form** is expressed 537 = 500 + 30 + 7; **expanded notation** is expressed 537 = (5 x 100) + (3x10) + (7x1). According to the standard, **expanded notation** is not appropriate for alignment to this standard.

Based on the wording in the standards ***base ten numerals*** will replace ***standard form; number names*** will replace ***word form; and expanded form*** *will be used.*

Sample Stems

Write each of the following in number names and word form:

25.403
10,028.06
19.79

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Mathematics	5.NBT.A.2
NBT A 2	**Number Sense and Operations in Base Ten** **Use place value system understanding to perform operations with multi-digit whole numbers to billions and decimals to thousandths.** Compare two numbers from billions to thousandths using the symbols >, = or <, and justify the solution.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will compare, describing both what is similar and different, two numbers from billions to thousandths.

The student will justify their comparison, e.g., using number lines, manipulatives, or drawings, then communicate the results of the comparison using the symbols <, >, or =.

Sample Stems

Is the following statement always, sometimes, or never true?

A decimal written to the thousandths place is larger than a number written to the hundredths place. Justify your answer.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit inequalities to strictly greater than or less than.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Mathematics	5.NBT.A.3
NBT A 3	**Number Sense and Operations in Base Ten** **Use place value system understanding to perform operations with multi-digit whole numbers to billions and decimals to thousandths.** Understand that in a multi-digit number, a digit represents 1/10 times what it would represent in the place to its left.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will understand that in a multi-digit number, a digit in one place represents $\frac{1}{10}$ of what it represents in the place to its left and 10 times as much as it represents in the place to its right.

Sample Stems

Write a decimal number in which the value of the digit 2 is $\frac{1}{10}$ the value of the digit 2 in 3.26. Explain how you know the number you wrote is correct.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NBT.A.4
NBT A 4	**Number Sense and Operations in Base Ten** **Use place value system understanding to perform operations with multi-digit whole numbers to billions and decimals to thousandths.** Evaluate the value of powers of 10 and understand the relationship to the place value system.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will calculate, compare, or convert the value of powers of 10 (exponents with a base of 10) and understand the relationship to the place value system, e.g., $10^1=10$, $10^2=100$, $10^3=1000$, $3 \times 10^2=300$.

Note:
When using expanded notation with powers of ten, students could include parenthesis, such as $652 = (6 \times 10^2) + (5 \times 10^1) + (2 \times 10^0)$.

Sample Stems

Lilly multiplied the decimal 82.6 by 10 and obtained an answer of 82.60. Do you agree with Lilly's answer? Why or why not?

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit powers to whole numbers no greater than ten.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NBT.A.5
NBT A 5	**Number Sense and Operations in Base Ten** **Use place value system understanding to perform operations with multi-digit whole numbers to billions and decimals to thousandths.** Round numbers from billions to thousandths place.	
Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations. The student will use place value understanding to round whole numbers and decimals based on the context of the situation.		**Sample Stems** A decimal number has been rounded to 0.4, what might the original number have been? Additional Stems for 5th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.		**Calculator Designation** **NO** – a calculator will not be available for items
DOK Ceiling: 2		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

Grade 5 Mathematics

Mathematics		5.NBT.A.6
NBT A 6	**Number Sense and Operations in Base Ten** **Use place value system understanding to perform operations with multi-digit whole numbers to billions and decimals to thousandths.** Add and subtract multi-digit whole numbers and decimals to the thousandths place, and justify the solution.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will add and subtract multi-digit whole numbers and decimals to the thousandths place using strategies based on properties, e.g. place value, partial sums, partial differences, and defend their solutions.

The student will generate solutions to problems with or without context and explain their reasoning in addition and subtraction of multi-digit numbers.

Note:
Decimals should include a digit in the ones place, e.g., 0.45, 12.374.

Sample Stems

The decimal points have been erased from the addends on the left-hand side of the equation below. Place a decimal point in each addend to make the equation true.

5 + 561 + 47 + 20 = 6.78

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Mathematics	5.NBT.A.7
NBT A 7	**Number Sense and Operations in Base Ten** **Use place value system understanding to perform operations with multi-digit whole numbers to billions and decimals to thousandths.** Multiply multi-digit whole numbers and decimals to the hundredths place, and justify the solution.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will multiply multi-digit whole numbers and decimals to the hundredths place using strategies based on properties, e.g. place value, partial products, and justify their solutions.

The student will generate solutions to problems with or without context and explain their reasoning in multiplication of multi-digit numbers.

Note:
Decimals should include a digit in the ones place, e.g., 0.45, 12.374.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving multiplication of multi-digit whole numbers and decimals to the hundredths place.

Sample Stems

Tina is in class where they are multiplying multi-digit whole numbers and decimal numbers. Once they find the product, students are asked to justify the solution. The problem being discussed is 364 x 2.54.

Tina thinks about a similar problem, 350 x 2.5 and has a strategy to describe why that product is 875. What strategy might Tina be using and how could that help justify the product of the problem being discussed?

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits
No Limits.

Calculator Designation
NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics	5.NBT.A.8
NBT A 8	**Number Sense and Operations in Base Ten** **Use place value system understanding to perform operations with multi-digit whole numbers to billions and decimals to thousandths.** Divide multi-digit whole numbers and decimals to the hundredths place using up to two-digit divisors and four-digit dividends, and justify the solution.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will divide multi-digit whole numbers and decimals to the hundredths place using strategies based on properties, e.g. place value, partial quotients, and justify their solutions.

The student will generate solutions to problems with or without context and explain their reasoning.

Note:
Decimals should include a digit in the ones place, e.g., 0.45, 12.374.

In 5th grade, division could result in situations with a remainder. Typically, if the dividend is a decimal number the remainder may be represented as a decimal, otherwise either represented as a whole number, e.g., r 9, or as a decimal is appropriate. Since 5th grade doesn't include dividing by fractions, the divisor should be a whole number.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving dividing multi-digit whole numbers and decimals to the hundredths place using up to two-digit divisors and four-digit dividends.

Sample Stems

Students are finding the solution to the problem, $325 \div 52$.

One student who solves the problem to find the solution is 6.25.

Another student solves the problem and finds the solution to be 6 r 13 (6 remainder 13).

If both students are correct, describe a situation where the way each solution was represented would be appropriate to the context.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

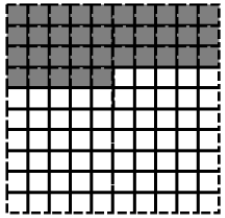
Mathematics		5.NF.A.1
NF A 1	**Number Sense and Operations in Fractions** **Understand the relationship between fractions and decimals (denominators that are factors of 100).** Understand that parts of a whole can be expressed as fractions and/or decimals.	**PRIORITY STANDARD**

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will demonstrate understanding that parts of a whole can be expressed as fractions and/or decimals, e.g., understanding the relationship between equivalent fractions and decimals, or that fractions and decimals are representations of specific numbers.

Sample Stems

What part of the hundredths grid is shaded below? Represent the shaded portion in decimal form.



Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit denominators to 1, 2, 4, 5, 10, 20, 25, 50 or 100 when working with fractions and decimals.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NF.A.2
NF A 2	**Number Sense and Operations in Fractions** **Understand the relationship between fractions and decimals (denominators that are factors of 100).** Convert decimals to fractions and fractions to decimals.	**PRIORITY STANDARD**

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

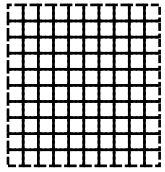
The student will demonstrate an understanding of how decimals and fractions can be equivalent representations of the same number.

The student will convert decimals to fractions and fractions to decimals and demonstrate an understanding of the relationship between equivalent fractions and decimals.

Note:
Fractions and decimals may include those that are greater than 1, which may be expressed as mixed numbers.

Sample Stems

Shade $\frac{1}{4}$ of the grid below.



What decimal does the shaded part represent?

What decimal does the unshaded part represent?

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit denominators to 1, 2, 4, 5, 10, 20, 25, 50 or 100.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Mathematics		5.NF.A.3
NF A 3	**Number Sense and Operations in Fractions** **PRIORITY STANDARD** **Understand the relationship between fractions and decimals (denominators that are factors of 100).** Compare and order fractions and/or decimals to the thousandths place using the symbols >, = or <, and justify the solution.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will compare and order fractions and/or decimals to the thousandth place by reasoning about their quantity (value and size), e.g., by comparing to a number such as $\frac{1}{2}$, creating common denominators or numerators, etc.

The student will justify their comparison, e.g., using number lines, manipulatives, or drawings, then communicate the results of the comparison using the symbols <, >, or =.

Note:
Fractions and decimals may include those that are greater than 1, which may be expressed as mixed numbers.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving comparing and ordering fractions and/or decimals to the thousandths place.

Sample Stems

Given the numbers listed below, place them in order from least to greatest. Explain why this order is correct.

$\frac{5}{4}$ 1.4 $\frac{9}{5}$ $\frac{11}{5}$ 2.001 $\frac{7}{4}$

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit denominators to 1, 2, 4, 5, 10, 20, 25, 50 or 100 when working with fractions and decimals.
Limit inequalities to strictly greater than or less than.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NF.B.4
NF B 4	**Number Sense and Operations in Fractions** **Perform operations and solve problems with fractions and decimals.** Estimate results of sums, differences and products with fractions and decimals to the thousandths.	**PRIORITY STANDARD**

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The student will estimate results of sums, differences, and products with fractions and justify their thinking using words or models. The student will estimate results of problems with or without context involving sums, differences, and products with decimals to thousandths place, and justify their thinking using words or models. Note: Fractions and decimals may include those that are greater than 1, which may be expressed as mixed numbers. **Mathematical Fluency** is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution. The student will use and explain multiple strategies to solve problems with or without context involving estimating results of sums, differences and products with fractions and decimals to the thousandths.	Kori claims that a good estimate for 6.372 – 2.4 would be about 4. Do you agree with Kori? Support your answer using words or models. Additional Stems for 5th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **NO** – a calculator will not be available for items
DOK Ceiling: 2	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 5 Mathematics

Mathematics		5.NF.B.5.a
NF	**Number Sense and Operations in Fractions**	**PRIORITY STANDARD**
B	**Perform operations and solve problems with fractions and decimals.**	
5	Justify the reasonableness of a product when multiplying with fractions.	
a	Estimate the size of the product based on the size of the two factors.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.NF.B.5 (a through d) show how 5th grade students will solve problems with or without context by justifying the reasonableness of a product when multiplying with fractions, e.g., using models or strategies.

The student will estimate how big/small the product of two fractions will be based on the size of the two factors and the meaning of multiplication, e.g., $\frac{3}{5}$ of $\frac{1}{2}$ is a little bigger than $\frac{1}{4}$.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving estimating the size of the product based on the size of the two factors.

Sample Stems

For the problems listed below, describe the strategies you would use to estimate, this means before you calculate, how the product will be greater than or less than $\frac{1}{2}$?

$\frac{1}{3} \times \frac{1}{2}$ $\quad$ $\frac{1}{2} \times \frac{2}{3}$

$\frac{1}{8} \times \frac{4}{5}$ $\quad$ $\frac{5}{6} \times \frac{7}{8}$

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NF.B.5.b
NF	**Number Sense and Operations in Fractions**	**PRIORITY STANDARD**
B	**Perform operations and solve problems with fractions and decimals.**	
5	Justify the reasonableness of a product when multiplying with fractions.	
b	Explain why multiplying a given number by a fraction greater than 1 results in a product larger than the given number.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.NF.B.5 (a through d) show how 5th grade students will solve problems with or without context by justifying the reasonableness of a product when multiplying with fractions, e.g., using models or strategies.

The student will understand and explain with words or models why multiplying a given number by a number greater than 1, e.g., fraction, mixed number, or whole number, results in a product larger than the given number.

The focus for this expectation is the student explaining what happens when multiplying by a number greater than one, rather than calculating the solution.

Note:
A given number for this standard could either be a whole number or fractional number, including a mixed number.

Sample Stems

Dani is working to understand what happens when we compute with fractions. She believes that when you multiply by a fraction the product will be smaller than the original number.

Do you agree with Dani? Explain why or why not using some examples.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NF.B.5.c
NF	**Number Sense and Operations in Fractions**	**PRIORITY STANDARD**
B	**Perform operations and solve problems with fractions and decimals.**	
5	Justify the reasonableness of a product when multiplying with fractions.	
c	Explain why multiplying a given number by a fraction less than 1 results in a product smaller than the given number.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.NF.B.5 (a through d) show how 5th grade students will solve problems with or without context by justifying the reasonableness of a product when multiplying with fractions, e.g., using models or strategies.

The student will understand and explain with words or models why multiplying a given number by a fraction between zero and 1 results in a product smaller than the given number.

The focus for this expectation is the student explaining what happens when multiplying by a number between zero and one, rather than calculating the solution.

Note:
A given number for this standard could either be a whole number or fractional number, including a mixed number.

Sample Stems

Donnie claims that multiplying two numbers will always generate a product larger than the original numbers. Describe how you agree or disagree with Donnie. Use words, number lines, other models, or representations to support your description.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NF.B.5.d
NF	**Number Sense and Operations in Fractions**	**PRIORITY STANDARD**
B	**Perform operations and solve problems with fractions and decimals.**	
5	Justify the reasonableness of a product when multiplying with fractions.	
d	Explain why multiplying the numerator and denominator by the same number is equivalent to multiplying the fraction by 1.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.NF.B.5 (a through d) show how 5th grade students will solve problems with or without context by justifying the reasonableness of a product when multiplying with fractions, e.g., using models or strategies.

The student will understand and explain with words or models why multiplying the numerator and denominator by the same number has the same effect as multiplying the fraction by 1, e.g., multiplying $\frac{2}{5}$ by $\frac{3}{3}$ can be seen as partitioning each fifth into 3 parts, resulting in $\frac{6}{15}$. The total size of the original quantity is unchanged.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving multiplying the numerator and denominator by the same number which is equivalent to multiplying the fraction by 1.

Sample Stems

Roger says to change the fraction $\frac{3}{4}$ to its equivalent fraction $\frac{9}{12}$, you multiply by 3. Rick disagrees. Who is correct and why?

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries – Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Mathematics		5.NF.B.6
NF B 6	**Number Sense and Operations in Fractions** **PRIORITY STANDARD** **Perform operations and solve problems with fractions and decimals.** Solve problems involving addition and subtraction of fractions and mixed numbers with unlike denominators, and justify the solution.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will solve problems with or without context involving adding and subtracting fractions and mixed numbers with unlike denominators and justify the sums and differences.

The student will explain the reasonableness of an answer, e.g., determine if a given justification is valid, identify the mistake in the process used to solve a problem.

Note:
Instructional focus should include students recognizing various equivalent forms which may, in certain situations, be better answers, e.g., $\frac{4}{8}$, $\frac{2.5}{5}$ are acceptable and equivalent forms of $\frac{1}{2}$. Understanding the relationship and equivalence is more important than using a particular form.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving addition and subtraction of fractions and mixed numbers with unlike denominators.

Sample Stems

Use words, a picture, a number line, a math sentence, or other math strategies to show the answer to the following equation.

$$\frac{3}{4} + \frac{1}{6} = ?$$

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NF.B.7.a
NF	**Number Sense and Operations in Fractions**	**PRIORITY STANDARD**
B	**Perform operations and solve problems with fractions and decimals.**	
7	Extend the concept of multiplication to multiply a fraction or whole number by a fraction.	
a	Recognize the relationship between multiplying fractions and finding the areas of rectangles with fractional side lengths.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.NF.B.7 (a through c) show how 5th grade students will extend the concept of multiplication to multiply a fraction or whole number by a fraction and use modeling to justify their reasoning when solving problems with or without context.

The student will describe how multiplying fractions relates to finding the areas of rectangles with fractional side lengths.

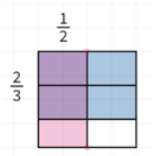
Note:
Instructional focus should include students recognizing various equivalent forms which may, in certain situations, be better answers, e.g., $\frac{4}{8}$, $\frac{2.5}{5}$ are acceptable and equivalent forms of $\frac{1}{2}$. Understanding the relationship and equivalence is more important than using a particular form.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving the relationship between multiplying fractions and finding the areas of rectangles with fractional side lengths.

Sample Stems

Cory is working to solve the expression $\frac{2}{3} \times \frac{1}{2}$ and wants to model the solution using the area of a rectangle with side lengths $\frac{2}{3}$ units and $\frac{1}{2}$ units. Cory's model is shown below.



What will be Cory's solution? Explain how using the rectangle models this problem to support the solution.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit side lengths to numbers less than 10 and may include mixed numbers.
Limit denominators to 2, 3, 4, 5, 6, 8, 10, 12, 20, 25, 50 or 100.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NF.B.7.b
NF	**Number Sense and Operations in Fractions**	**PRIORITY STANDARD**
B	**Perform operations and solve problems with fractions and decimals.**	
7	Extend the concept of multiplication to multiply a fraction or whole number by a fraction.	
b	Calculate and interpret the product of a fraction by a whole number and a whole number by a fraction.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.NF.B.7 (a through c) show how 5th grade students will extend the concept of multiplication to multiply a fraction or whole number by a fraction and use modeling to justify their reasoning when solving problems with or without context.

The student will calculate and interpret multiplication of a fraction or a whole number by a fraction, e.g., $\frac{1}{5}$ x 12 is one fifth of twelve objects; 4 x $2\frac{1}{2}$ is four groups of two and four groups of $\frac{1}{2}$.

Note:
Instructional focus should include students recognizing various equivalent forms which may, in certain situations, be better answers, e.g., $\frac{4}{8}$, $\frac{2.5}{5}$ are acceptable and equivalent forms of $\frac{1}{2}$. Understanding the relationship and equivalence is more important than using a particular form.

Sample Stems

Calculate and interpret the product for the problem listed below.

$$10 \times \frac{2}{3}$$

Create an everyday situation where this problem could represent a way to find the solution.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit denominators to 2, 3, 4, 5, 6, 8, 10, 12, 20, 25, 50 or 100.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NF.B.7.c
NF	**Number Sense and Operations in Fractions**	**PRIORITY STANDARD**
B	**Perform operations and solve problems with fractions and decimals.**	
7	Extend the concept of multiplication to multiply a fraction or whole number by a fraction.	
c	Calculate and interpret the product of two fractions less than one.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.NF.B.7 (a through c) show how 5th grade students will extend the concept of multiplication to multiply a fraction or whole number by a fraction and use modeling to justify their reasoning when solving problems with or without context.

The student will calculate the product when multiplying two fractions between zero and one.

The student will interpret the product of two fractions less than one. The student should use mathematical reasoning, models, or other strategies to support the meaning of the product, .e.g., $\frac{1}{2}$ of $\frac{8}{12}$ is $\frac{4}{12}$ because half of 8 is 4; $\frac{3}{4}$ of $\frac{1}{2}$ of a pizza is $\frac{3}{8}$ of the whole pizza because $\frac{1}{4}$ of $\frac{1}{2}$ of a pizza is $\frac{1}{8}$ of the pizza.

Note:
Instructional focus should include students recognizing various equivalent forms which may, in certain situations, be better answers, e.g., $\frac{4}{8}$, $\frac{2.5}{5}$ are acceptable and equivalent forms of $\frac{1}{2}$. Understanding the relationship and equivalence is more important than using a particular form.

Sample Stems

Calculate the solution to the following problem. Use words, number lines, other models, or other math strategies to show the meaning of the solution.

$$\frac{3}{4} \times \frac{2}{3} = ?$$

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit denominators to 2, 3, 4, 5, 6, 8, 10, 12, 20, 25, 50 or 100.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NF.B.8.a
NF	**Number Sense and Operations in Fractions**	**PRIORITY STANDARD**
B	**Perform operations and solve problems with fractions and decimals.**	
8	Extend the concept of division to divide unit fractions and whole numbers by using visual fraction models and equations.	
a	Calculate and interpret the quotient of a unit fraction by a non-zero whole number.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.NF.B.8 (a and b) show how 5th grade students will extend the concept of division to divide unit fractions and whole numbers by using visual fraction models and equations when solving problems with or without context.

The student will calculate and interpret the quotient of a unit fraction by a non-zero whole number, e.g., $\frac{1}{4}$ of a pizza divided by 3 is $\frac{1}{12}$ of a pizza because each fourth is partitioned into 3 parts to make 12 total parts.

Note:
Instructional focus should include students recognizing various equivalent forms which may, in certain situations, be better answers, e.g., $\frac{4}{8}$, $\frac{2.5}{5}$ are acceptable and equivalent forms of $\frac{1}{2}$. Understanding the relationship and equivalence is more important than using a particular form.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving calculating and interpreting the quotient of a unit fraction by a non-zero whole number.

Sample Stems

Create an everyday situation where this problem could be represented and find the solution.

$$\frac{1}{8} \div 24$$

Calculation and interpretation may be supported by diagrams, models, or words.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit denominators of unit fractions to 2, 3, 4, 5, 6, 8, 10, 12, 20, 25, 50 or 100.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.NF.B.8.b
NF	**Number Sense and Operations in Fractions**	**PRIORITY STANDARD**
B	**Perform operations and solve problems with fractions and decimals.**	
8	Extend the concept of division to divide unit fractions and whole numbers by using visual fraction models and equations.	
b	Calculate and interpret the quotient of a whole number by a unit fraction.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.NF.B.8 (a and b) show how 5th grade students will extend the concept of division to divide unit fractions and whole numbers by using visual fraction models and equations when solving problems with or without context.

The student will calculate and interpret the quotient of a whole number by a unit fraction, e.g., 5 divided by $\frac{1}{4}$ is 20 because it takes 20 fourths to make 5 whole units.

Note:
Instructional focus should include students recognizing various equivalent forms which may, in certain situations, be better answers, e.g., $\frac{4}{8}$, $\frac{2.5}{5}$ are acceptable and equivalent forms of $\frac{1}{2}$. Understanding the relationship and equivalence is more important than using a particular form.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving calculating and interpreting the quotient of a whole number by a unit fraction.

Sample Stems

Create an everyday situation where this problem could be represented and find the solution.

$$24 \div \frac{1}{8}$$

Calculation and interpretation may be supported by words, numbers, diagrams, or models.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit denominators of unit fractions to 2, 3, 4, 5, 6, 8, 10, 12, 20, 25, 50 or 100.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.RA.A.1.a
RA	**Relationships and Algebraic Thinking**	**PRIORITY STANDARD**
A	**Represent and analyze patterns and relationships.**	
1	Investigate the relationship between two numeric patterns.	
a	Generate two numeric patterns given two rules.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.RA.A.1 (a through d) show how 5th grade students will investigate the relationship between two numeric patterns.

The student will generate two numeric patterns given starting numbers and both rules.

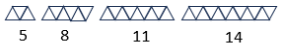
The student will extend two numeric patterns given two rules and/or fill in missing terms given two incomplete patterns and their rules.

Standards 5.RA.A.1 (a through d) should be considered being taught as a connected whole. This would provide context for students as they consider these concepts.

Generating numeric patterns can come from multiple structures, e.g., a table, a graph, a given rule, a pattern. In describing the numbers in the pattern, one should consider the term number, e.g., first term, second term, etc., as well as the value in the pattern.

Using the pattern 3, 4, 5, 6, we could think of the first term as 3, the second term as 4 and so forth. This would link to listing the pattern as an ordered pair as (1, 3), (2, 4), (3, 5), and (4, 6) where (1, 3) is representing (term number "1", pattern value "3"). To describe the same pattern (3, 4, 5, 6) could include indicating that the pattern starts at 3 and grows by adding 1. And a second pattern (5, 8, 11, 14) could include indicating that the pattern starts at 5 and grows by adding 3.

A pictorial version might show the perimeter of connected triangles as shown below:



Sample Stems

Find the 6th number in both of the following numeric patterns.

Pattern One starts at 3 and grows by adding 1 and Pattern Two starts at 4 and grows by adding 3.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit patterns (up to seven terms) to whole numbers.
Limit patterns to include addition, subtraction, multiplication, or division.
Limit rules to one operation for each pattern.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.RA.A.1.b
RA	**Relationships and Algebraic Thinking**	**PRIORITY STANDARD**
A	**Represent and analyze patterns and relationships.**	
1	Investigate the relationship between two numeric patterns.	
b	Translate two numeric patterns into two sets of ordered pairs.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.RA.A.1 (a through d) show how 5th grade students will investigate the relationship between two numeric patterns.

The student will represent (translate) both numerical patterns as two sets of ordered pairs which can be organized in lists or tables.

Standards 5.RA.A.1 (a through d) should be considered being taught as a connected whole. This would provide context for students as they consider these concepts.

Generating numeric patterns can come from multiple structures, e.g., a table, a graph, a given rule, a pattern. In describing the numbers in the pattern, one should consider the term number, e.g., first term, second term, etc., as well as the value in the pattern.

Using the pattern 3, 4, 5, 6, we could think of the first term as 3, the second term as 4 and so forth. This would link to listing the pattern as an ordered pair as (1, 3), (2, 4), (3, 5), and (4, 6) where (1, 3) is representing (term number "1", pattern value "3").

Sample Stems

Using the following two numeric patterns, translate the patterns into two sets of ordered pairs representing each pattern.

Pattern One starts at 3 and grows by adding 1 and Pattern Two starts at 4 and grows by adding 3.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit patterns (up to seven terms) to whole numbers.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.RA.A.1.c
RA	**Relationships and Algebraic Thinking**	**PRIORITY STANDARD**
A	**Represent and analyze patterns and relationships.**	
1	Investigate the relationship between two numeric patterns.	
c	Graph numeric patterns on the Cartesian coordinate plane.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.RA.A.1 (a through d) show how 5th grade students will investigate the relationship between two numeric patterns.

The student will use ordered pairs given two numeric patterns to graph on the Cartesian coordinate plane.

Standards 5.RA.A.1 (a through d) should be considered being taught as a connected whole. This would provide context for students as they consider these concepts.

Generating numeric patterns can come from multiple structures, e.g., a table, a graph, a given rule, a pattern. Each numeric pattern will need either an ordered pair or some other descriptor to graph on a Cartesian coordinate plane.

Sample Stems

Graph both numeric patterns listed below on the Cartesian coordinate plane.

Pattern One starts at 3 and grows by adding 1, so the first five ordered pairs would be (1, 3), (2, 4), (3, 5), (4, 6), (5, 7) and pattern Two starts at 5 and grows by adding 3, so the first five ordered pairs would be (1, 5), (2, 8), (3, 11), (4, 14), (5, 17).

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit patterns to show both term number and pattern value, **this means the two patterns should not be merged into one pattern either as a solution or graph**.
Limit patterns (up to seven terms) to whole numbers.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.RA.A.1.d
RA	**Relationships and Algebraic Thinking**	**PRIORITY STANDARD**
A	**Represent and analyze patterns and relationships.**	
1	Investigate the relationship between two numeric patterns.	
d	Identify the relationship between two numeric patterns.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.RA.A.1 (a through d) show how 5th grade students will investigate the relationship between two numeric patterns.

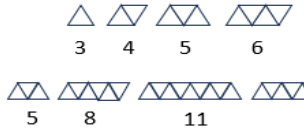
The student will investigate (identify, explain, and/or analyze) the relationship between the two numerical patterns expressed as rules, tables, sets of ordered pairs or graphs.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving identifying the relationship between two numeric patterns.

Sample Stems

Patti is looking at some patterns generated by connecting triangles and looking at the resulting perimeter as shown below.



Patti sees that she could describe the first pattern by the rule "Starting at 0, add 3" and the second pattern by the rule "Starting at 0, add 6". Use the figures or the rules to generate terms for each rule. How do the patterns compare?

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit patterns to show both term number and pattern value, **this means the two patterns should not be merged into one pattern either as a solution or graph**.
Limit patterns (up to seven terms) to whole numbers.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.RA.A.2
RA A 2	**Relationships and Algebraic Thinking** **Represent and analyze patterns and relationships.** Write a rule to describe or explain a given numeric pattern.	**PRIORITY STANDARD**

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will write a rule to describe or explain the given numerical pattern. When communicating a rule, e.g., written, verbal, in a table, on a graph, an expression, the student must include the starting number.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving writing a rule to describe or explain a given numeric pattern.

Sample Stems

Given the pattern $\frac{3}{4}, \frac{6}{4}, \frac{9}{4}, \frac{12}{4}$... generate the rule.

How could the pattern be represented in a different way?

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit patterns using multiplication and division to contain only whole numbers.
Limit pattern to include one operation.
Limit denominators to 2, 3, 4, 5, 6, 8, 9, 10, 12, 20, 25, 50 or 100.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.RA.B.3
RA **B** **3**	**Relationships and Algebraic Thinking** **Write and interpret numerical expressions.** Write, evaluate and interpret numeric expressions using the order of operations.	
Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations. The student will write, evaluate, and interpret numerical expressions using order of operations. Note: Exponents are not included in expressions at grade 5.		**Sample Stems** Identify which expressions are equivalent and are not equivalent to 20 + 3 and explain why. A. 4 x (5+3) B. 4 x 5 +3 C. 4 x [5+3] D. (4 x 5) +3 Additional Stems for 5th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits Limit expressions to whole numbers.		**Calculator Designation** **NO** – a calculator will not be available for items
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

Grade 5 Mathematics

Mathematics		5.RA.B.4
RA **B** **4**	**Relationships and Algebraic Thinking** **Write and interpret numerical expressions.** Translate written expressions into algebraic expressions.	
Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations. The student will translate written expressions into algebraic expressions. Note: Algebraic expressions include numbers and variables. Expressions do not include an equal sign.		**Sample Stems** John has some cookies. Gina has four fewer than John. Write an algebraic expression to represent the number of cookies John has. Additional Stems for 5th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits Limit expressions to include one variable.		**Calculator Designation** **NO** – a calculator will not be available for items
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

Grade 5 Mathematics

Mathematics		5.RA.C.5
RA **C** **5**	**Relationships and Algebraic Thinking** **Use the four operations to represent and solve problems.** Solve and justify multi-step problems involving variables, whole numbers, fractions and decimals.	**PRIORITY STANDARD**

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will solve multi-step problems, with or without context, including variables (letters representing an unknown quantity), whole numbers, fractions, and decimals. (Note: division of fractions by fractions is a 6th grade standard)

The student will represent these problems with a variable and can use estimation to explain the reasonableness of answers.

Note:
Instructional focus should include students recognizing various equivalent forms which may, in certain situations, be better answers, e.g., $\frac{4}{8}$, $\frac{2.5}{5}$ are acceptable and equivalent forms of $\frac{1}{2}$. Understanding the relationship and equivalence is more important than using a particular form.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving solving and justifying multi-step problems involving variables, whole numbers, fractions, and decimals. (Does not mean create multiple solutions)

In 5th grade, division could result in situations with a remainder. Typically, if the dividend is a decimal number the remainder may be represented as a decimal, otherwise either represented as a whole number, e.g., r 9, or as a decimal is appropriate. Since 5th grade doesn't include dividing by fractions, the divisor should be a whole number.

Sample Stems

Jameson completes $\frac{3}{4}$ of a 400-piece puzzle. Gabe completes $\frac{7}{8}$ of a 200-piece puzzle. Who has completed more of their puzzle? Use words, pictures, number lines, models, or other strategies to justify which student has completed more.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.GM.A.1
GM A 1	**Geometry and Measurement** **Classify two- and three- dimensional geometric shapes.** Understand that attributes belonging to a category of figures also belong to all subcategories.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The student will identify and describe attributes belonging to a category of two-dimensional or three-dimensional geometric shapes. This standard is a support to standard 5.GM.A.2 where shapes are classified in a hierarchy based on their properties. Two-dimensional attributes being identified and described include side lengths, number of sides, number of angles, and angle measurement. Three-dimensional attributes being identified and described include shapes of faces, number of faces, shape of bases, number of bases, edges, and vertices. Subcategories in this standard provide guidance to the attributes students need to understand, e.g., students should know and be able to describe prisms as having rectangular faces and two bases.	Use attributes of the following geometric shapes to generate statements that are always true, sometimes true, or never true. Be sure to explain why your statement is correctly labeled. Shapes: Square, Rectangle, Parallelogram, Trapezoid, Rhombus, Kite. For example: A Square is a Rectangle. (Always True because squares have 4 90-degree angles and opposite sides are congruent). Additional Stems for 5th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits Limit categorization of shapes into one category. Limit categories to: circles, polygons (limited to all triangles, all quadrilaterals, pentagons, hexagons, or octagons), prisms, cylinders, cones, spheres, and pyramids.	**Calculator Designation** **NO** – a calculator will not be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 5 Mathematics

Mathematics		5.GM.A.2
GM A 2	**Geometry and Measurement** **Classify two- and three- dimensional geometric shapes.** Classify figures in a hierarchy based on properties.	**PRIORITY STANDARD**

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will classify figures in a hierarchy based on properties and justify/explain their reasoning. The student will identify multiple categories to which a figure belongs.

Situation regarding the definition of a trapezoid:
Since students across the state have different instructional resources (with two different definitions) the state of Missouri has chosen not to assess students on the definition of a trapezoid. There will be trapezoids on the assessment, but not questions specific to the definition. We suggest that students should be aware of both definitions for trapezoids because the math we study is based upon rules (definitions, theorems, etc.). When those rules are changed or altered, new branches of math are created. This is one of the reasons it is important to understand the "rules" being used and it is something that is exciting about math that new things can be discovered or invented.

Sample Stems

Explain how a square is a rectangle, a rhombus, a parallelogram, quadrilateral, or polygon using words, drawings, or models.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit categories to: circles, polygons (limited to all triangles, all quadrilaterals, pentagons, hexagons, or octagons), prisms, and pyramids.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Mathematics		5.GM.A.3
GM A 3	**Geometry and Measurement** **Classify two- and three- dimensional geometric shapes.** Analyze and describe the properties of prisms and pyramids.	
Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations. The student will analyze how prisms and pyramids are similar and/or different, e.g., describing the number of edges, faces, vertices, and/or types of bases.		**Sample Stems** A prism and a pyramid have the same base. Which has more edges? How do you know? Additional Stems for 5th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.		**Calculator Designation** **NO** – a calculator will not be available for items
DOK Ceiling: 2		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

Grade 5 Mathematics

Mathematics		5.GM.B.4.a
GM	**Geometry and Measurement**	**PRIORITY STANDARD**
B	**Understand and compute volume.**	
4	Understand the concept of volume and recognize that volume is measured in cubic units.	
a	Describe a cube with edge length 1 unit as a "unit cube" and is said to have "one cubic unit" of volume and can be used to measure volume.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.GM.B.4 (a and b) show how 5th grade students will understand the concept of volume and recognize that volume is measured in cubic units.

The student will explore volume by using a cube with an edge length 1 unit. This cube can be called a "unit cube" and is a way to measure volume, e.g., fill a prism with cubes to measure the volume of the prism in cubic units.

The student will *begin to* develop an understanding that volume has three dimensions and how this is connected to an area which has two dimensions.

Sample Stems

Using cm cubes and 1-inch cubes, compare (describing similarities and differences) various prisms that have been provided. Predict the number of unit cubes needed to fill the prism.

Then follow the same process with the additional prisms provided.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.GM.B.4.b
GM	**Geometry and Measurement**	**PRIORITY STANDARD**
B	**Understand and compute volume.**	
4	Understand the concept of volume and recognize that volume is measured in cubic units.	
b	Understand that the volume of a right rectangular prism can be found by stacking multiple layers of the base.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.GM.B.4 (a and b) show how 5th grade students will understand the concept of volume and recognize that volume is measured in cubic units.

The student will understand that the volume of a right rectangular prism can be found by stacking multiple layers of cubes on the base.

The student will make connections between the number of cubes on the bottom layer (covering the base which has the same numeric value as area of the base) and number of layers (height) to find the volume of the right rectangular prism.

Sample Stems

Use the grid provided and cut out each of the four corners by the same number of squares, e.g., 1x1, 2x2. Fold up each side to make an open-ended box. Make predictions which box will hold the most cubes. After making your predictions, fill each box with cm cubes. Compare your results with classmates and look for patterns in the results.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit to whole-number edge lengths.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.GM.B.5
GM **B** **5**	**Geometry and Measurement** **Understand and compute volume.** Apply the formulas V = l × w × h and V = B × h for volume of right rectangular prisms with whole-number edge lengths.	
Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations. The student will apply the formulas $V = l \times w \times h$ and $V = B \times h$ to find the volume of right rectangular prisms with whole-number edge lengths with or without context. Note: The student should understand that either formula represents the equivalent representation, e.g., that the base of a prism will be composed of the $l \times w$. The student should recognize that a cube is a special prism that can be shown with only one edge labeled.		**Sample Stems** Build a figure that is 4 cm tall, 3 cm wide, and 2 cm long. What is its volume? Build another figure with the same volume. What are its measurements? Additional Stems for 5th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.		**Calculator Designation** **NO** – a calculator will not be available for items
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

Grade 5 Mathematics

Mathematics		5.GM.C.6.a
GM	**Geometry and Measurement**	**PRIORITY STANDARD**
C	**Graph points on the Cartesian coordinate plane within the first quadrant to solve problems.**	
6	Define a first quadrant Cartesian coordinate system.	
a	Represent the axes as scaled perpendicular number lines that both intersect at 0, the origin.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.GM.C.6 (a through d) show how 5th grade students will define the first quadrant in the Cartesian coordinate system.

The student will represent the first quadrant of the Cartesian coordinate system using scaled perpendicular number lines that intersect at 0 (the origin) as axes.

Note:
Even though students in 5th grade are working with decimals and fractions, scales on axes should be whole numbers for this expectation.

Sample Stems

Draw two number lines that perpendicularly intersect at each number line's zero. What would the intersection represent to this grid?

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit ordered pairs to intersections on coordinate grid lines.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.GM.C.6.b
GM	**Geometry and Measurement**	**PRIORITY STANDARD**
C	**Graph points on the Cartesian coordinate plane within the first quadrant to solve problems.**	
6	Define a first quadrant Cartesian coordinate system.	
b	Identify any point on the Cartesian coordinate plane by its ordered pair coordinates.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

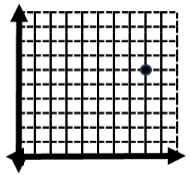
The expectations in 5.GM.C.6 (a through d) show how 5th grade students will define the first quadrant in the Cartesian coordinate system.

The student will identify any point in the first quadrant given the point's ordered pair coordinates.

Note:
Even though students in 5th grade are working with decimals and fractions, scales on axes should be whole numbers for this expectation.

Sample Stems

The grid below has a point at (8, 6).



Describe what you notice and what you wonder about that coordinate?

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit ordered pairs to intersections on coordinate grid lines.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.GM.C.6.c
GM	**Geometry and Measurement**	**PRIORITY STANDARD**
C	**Graph points on the Cartesian coordinate plane within the first quadrant to solve problems.**	
6	Define a first quadrant Cartesian coordinate system.	
c	Define the first number in an ordered pair as the horizontal distance from the origin.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.GM.C.6 (a through d) show how 5th grade students will define the first quadrant in the Cartesian coordinate system.

The student will define the first number in an ordered pair as the x-coordinate which represents the horizontal distance from the y-axis.

Note:
Even though students in 5th grade are working with decimals and fractions, scales on axes should be whole numbers for this expectation.

Sample Stems

Explain the meaning of the first coordinate in an ordered pair.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit ordered pairs to intersections on coordinate grid lines.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.GM.C.6.d
GM	**Geometry and Measurement**	**PRIORITY STANDARD**
C	**Graph points on the Cartesian coordinate plane within the first quadrant to solve problems.**	
6	Define a first quadrant Cartesian coordinate system.	
d	Define the second number in an ordered pair as the vertical distance from the origin.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 5.GM.C.6 (a through d) show how 5th grade students will define the first quadrant in the Cartesian coordinate system.

The student will define the second number in an ordered pair as the y-coordinate which represents the vertical distance from the x-axis.

Note:
Even though students in 5th grade are working with decimals and fractions, scales on axes should be whole numbers for this expectation.

Sample Stems

Explain the meaning of the second coordinate in an ordered pair.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit ordered pairs to intersections on coordinate grid lines.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 2

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.GM.C.7
GM C 7	**Geometry and Measurement** **Graph points on the Cartesian coordinate plane within the first quadrant to solve problems.** Plot and interpret points in the first quadrant of the Cartesian coordinate plane.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

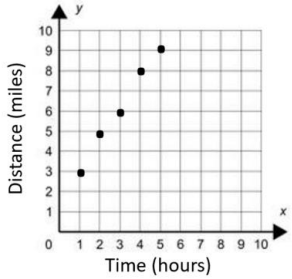
The student will plot and interpret points in the first quadrant of the Cartesian coordinate plane to represent problems with or without context.

In 5th grade interpreting points in the first quadrant of the Cartesian coordinate plane includes the relationship of the points to each other as well as in context of the given situation.

Note:
Even though students in 5th grade are working with decimals and fractions, scales on axes should be whole numbers for this expectation.

Sample Stems

Linda went for a hike. The graph below shows the distance she had hiked at various points in time.



How many hours did it take Linda to hike the first 5 miles?
What ordered pair describes how many miles Linda hiked in 5 hours?

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

Limit ordered pairs to intersections on coordinate grid lines.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.GM.D.8
GM D 8	**Geometry and Measurement** **Solve problems involving measurement and conversions within a measurement system.** Convert measurements of capacity, length and weight within a given measurement system.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The student will convert measurements of capacity, length, and weight within a single measurement system (customary-to-customary and metric-to-metric systems). Note: In fifth grade units could include the following: inches, feet, yards, miles, millimeters, centimeters, meters, kilometers, milligrams, grams, kilograms, ounces, pounds, tons, milliliters, liters, cups, pints, quarts, gallons.	A pitcher contains 2 liters of lemonade. If a glass can hold 250 milliliters, how many glasses can the pitcher of lemonade fill? Additional Stems for 5th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **NO** – a calculator will not be available for items
DOK Ceiling: 2	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Mathematics		5.GM.D.9
GM D 9	**Geometry and Measurement** **Solve problems involving measurement and conversions within a measurement system.** Solve multi-step problems that require measurement conversions.	**PRIORITY STANDARD**

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will solve multi-step problems with or without context that require conversion of measurements from a smaller unit to a larger unit or a larger unit to a smaller unit within a single measurement system (customary-to-customary and metric-to-metric systems).

Note:
In fifth grade units could include the following: inches, feet, yards, miles, millimeters, centimeters, meters, kilometers, milligrams, grams, kilograms, ounces, pounds, tons, milliliters, liters, cups, pints, quarts, gallons.

Mathematical Fluency is more than a quick answer on a timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution.

The student will use and explain multiple strategies to solve problems with or without context involving solving multi-step problems that require measurement conversions.

Sample Stems

Mr. Clark asked the students in his fourth-grade class to measure their heights. Here are the recorded heights of four of his students.

Student	Height
Renee	50 inches
Seth	$4\frac{1}{4}$ feet
Lynn	$1\frac{1}{2}$ yards
Rick	4 ft 4 in

List the four students from tallest to shortest.

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

No Limits.

Calculator Designation

NO – a calculator will not be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 5 Mathematics

Mathematics		5.DS.A.1
DS **A** **1**	**Data and Statistics** **Represent and analyze data** Create a line graph to represent a data set, and analyze the data to answer questions and solve problems.	
Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations. The student will create a line graph to represent a given or generated data set that shows the relationship between two variables, the dependent and independent, e.g., change over time. Creating a line graph includes students understanding the importance of identifying and labeling axes, titling the graph, and plotting the data accurately. The student will analyze the line graph to answer questions and solve problems by identifying trends that describe change, making predictions, and/or verifying that the graph represents the data.		**Sample Stems** Predict why the water usage in a house increases at 5PM. Additional Stems for 5th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits Limit to single line graphs.		**Calculator Designation** **NO** – a calculator will not be available for items
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

Mathematics		5.DS.A.2
DS A 2	**Data and Statistics** **PRIORITY STANDARD** **Represent and analyze data** Create a line plot to represent a given or generated data set, and analyze the data to answer questions and solve problems, recognizing the outliers and generating the median.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The student will create a line plot (dot plot) to represent a given or generated numerical data set by displaying the data as points above a number line showing the frequency of each value in the data set, e.g., each student measured the length of their own pencil. Creating a line plot includes students understanding the importance of identifying and labeling the number line, titling the line plot, and plotting the data accurately.

The student will analyze the line plot to answer questions and solve problems by recognizing outliers (points that are clearly outside the other group of data points), identifying the range, generating the median for both even and odd data sets, and verifying that the line plot represents the data.

Sample Stems

Below are the heights of fifth grade students in a class.

Create a line plot representing the height of the students. Use the line plot to describe how well the median for this set of data represents in the line plot.

Heights of the students measured as they were lined up:
4’ 7”, 4’ 9”, 4’ 8”, 4’ 8”, 4’ 9”, 4’ 8”, 4’ 10”, 4’ 11”, 5’ 6”, 4’ 5”, 4’ 7”, 4’ 7”, 4’ 9”

Additional Stems for 5th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

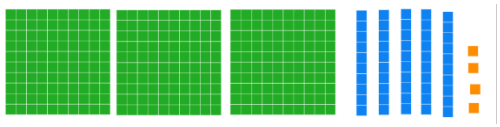
No Limits.

Calculator Designation

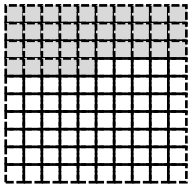
NO – a calculator will not be available for items

DOK Ceiling: 3

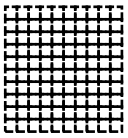
Item Format: Selected Response, Constructed Response, Technology Enhanced

Code	Sample Stem	Explanation
5.NBT.A.1	If each small square in the model represents 0.01, what decimal does the following model represent? 	
	Write each of the following in number names and word form: 25.403 10,028.06 19.79	
5.NBT.A.2	Is the following statement always, sometimes, or never true? A decimal written to the thousandths place is larger than a number written to the hundredths place. Justify your answer.	
	Sort the following numbers into two categories: those less than 5.5 and those larger than 5.5. 5.7 5.35 50.25 5.9 5.24 5.473	
5.NBT.A.3	Write a whole number in which the value of the digit 3 is 1/10 the value of the digit 3 in 23,456. Explain how you know the number you wrote is correct.	
	Write a decimal number in which the value of the digit 2 is 1/10 the value of the digit 2 in 3.26. Explain how you know the number you wrote is correct.	
5.NBT.A.4	Lilly multiplied the decimal 82.6 by 10 and obtained an answer of 82.60. Do you agree with Lilly's answer? Why or why not?	
5.NBT.A.5	A decimal number is rounded to 0.4, what might it have been?	

Grade 5 Mathematics

Code	Sample Stem	Explanation
5.NBT.A.6	The decimal points have been erased from the addends on the left-hand side of the equation below. Place a decimal point in each addend to make the equation true. 5 + 561 + 47 + 20 = 6.78	Let students create similar problems, both addition and subtraction, and erase the decimal points in the addends (or minuends and subtrahends) and switch with a partner to have them solve.
	The decimal points have been erased from the minuend and subtrahend on the left-hand side of the equation below. Place a decimal point in each value on the left-hand side to make the equation true. 21 – 63 = 1.47	Let students create similar problems, both addition and subtraction, and erase the decimal points in the addends (or minuends and subtrahends) and switch with a partner to have them solve.
5.NBT.A.7	Tina is in class where they are multiplying multi-digit whole numbers and decimal numbers. Once they find the product, students are asked to justify the solution. The problem being discussed is 364 x 2.54. Tina thinks about a similar problem, 350 x 2.5 and has a strategy to describe why that product is 875. What strategy might Tina be using and how could that help justify the product of the problem being discussed?	
5.NBT.A.8	Students are finding the solution to the following problem, $325 \div 52$. One student who solves the problem to find the solution is 6.25. Another student solves the problem and finds the solution to be 6 r 13 (6 remainder 13). If both students are correct, describe a situation where the way each solution was represented would be appropriate to the context.	
5.NF.A.1	What part of the hundredths grid below is shaded?  Represent the shaded portion in decimal form.	Addition options should include the option to list other representations, fractions, and decimals, and choose which are equivalent to the shaded portion.

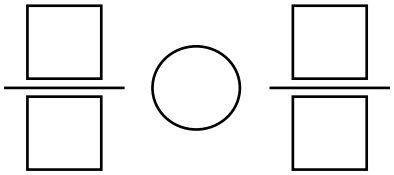
Grade 5 Mathematics

Code	Sample Stem	Explanation
5.NF.A.2	Shade $\frac{1}{4}$ of the grid below.  What decimal does the shaded part represent? What decimal does the unshaded part represent?	
5.NF.A.3	Given the numbers listed below, place them in order from least to greatest. Explain why this order is correct. $\frac{5}{4}$ 1.4 $\frac{9}{5}$ $\frac{11}{5}$ 2.001 $\frac{7}{4}$	
	Kori claims that a good estimate for 6.372 – 2.4 would be about 4. Do you agree with Kori? Support your answer using words or models.	
	Estimate the following products. Be sure to justify your estimates using words or models. 153.6 x 0.99 153.6 x 9.9 156.6 x 0.49	
5.NF.B.4	Renee and Linda posted their selfies on Instagram. Linda has one-fourth the number of likes as Renee has. If $L = \frac{1}{4}R$ is a true statement, what do the following expressions represent? L R 4L R/4 L + R	

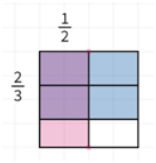
Grade 5 Mathematics

Code	Sample Stem	Explanation
5.NF.B.5a	For the problems listed below, describe the strategies you would use to estimate, this means before you calculate, how the product will be greater than or less than $\frac{1}{2}$? $\frac{1}{3}\times\frac{1}{2}$ $\frac{1}{2}\times\frac{2}{3}$ $\frac{1}{8}\times\frac{4}{5}$ $\frac{5}{6}\times\frac{7}{8}$	
	Explain what each blank must be for the product to be greater than $\frac{1}{2}$ $\frac{1}{2}\times\frac{\square}{\square}$	
	Use words, pictures, number lines, math sentences or other math strategies to estimate the answer to the following equation. $\frac{3}{4}\times\frac{95}{100}$ =?	
5.NF.B.5b	Explain why multiplying $2\frac{5}{6}$ by $1\frac{2}{5}$ will result in a product larger than $2\frac{5}{6}$.	
	Dani is working to understand what happens when we compute with fractions. She believes that when you multiply by a fraction the product will be smaller than the original number. Do you agree with Dani? Explain why or why not using some examples.	
	Fill in the squares to make the inequality true. $\frac{3}{8}\times\frac{\square}{\square}<\frac{3}{8}$ $\frac{3}{8}\times\frac{\square}{\square}>\frac{3}{8}$	
5.NF.B.5c	Donnie claims that multiplying two numbers will always generate a product larger than the original numbers. Describe how you agree or disagree with Donnie. Use number lines, models, or other representations to support your description.	
	I want to multiply two fractions and the answer must be just a little bit less than each of them. What could I multiply?	

Grade 5 Mathematics

Code	Sample Stem	Explanation
	Explain why the following equation must be true. $\frac{2}{3} = \frac{4}{6}$	
	Roger says to change the fraction $\frac{3}{4}$ to its equivalent fraction $\frac{9}{12}$, you multiply by 3. Rick disagrees. Who is correct and why?	
5.NF.B.5d	Fill in the squares to make the equation true. $\frac{1}{2} \times \frac{\square}{\square} = \frac{4}{8}$ $\frac{3}{4} \times \frac{\square}{\square} = \frac{9}{12}$ $\frac{2}{3} \times \frac{\square}{\square} = \frac{10}{15}$ What do you notice about the solutions? In each problem, how does the product compare to the beginning fraction?	
	Numbers randomly drawn and filled in immediately after drawing. Trying to get the best solution. Which operation, + or -, would create the largest solution 	Multiple variations possible for this problem. Numbers could be generated using dice or some other random generator. The "best answer" is also a conversation. It could be greatest, least, closest to zero (or some other number). Here are some possible numbers sets to use: 0,3,6,8 2,1,6,8 5,5,7,3 5,3,8,2
5.NF.B.6	Use words, a picture, a number line, a math sentences or other math strategies to show the answer to the following equation. $\frac{3}{4} + \frac{1}{6}$=?	

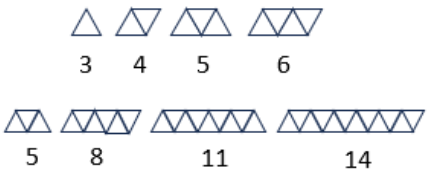
Grade 5 Mathematics

Code	Sample Stem	Explanation
5.NF.B.7a	Cory is working to solve the expression $\frac{2}{3} \times \frac{1}{2}$ and wants to model the solution using the area of a rectangle with side lengths $\frac{2}{3}$ units and $\frac{1}{2}$ units. Cory's model is shown below.  What will be Cory's solution? Explain how using the rectangle models this problem to support the solution.	
	What is the area of a rectangle that is $4\frac{2}{3}$ feet by $2\frac{3}{4}$ feet?	
5.NF.B.7b	Calculate and interpret the product for the problem listed below. $10 \times \frac{2}{3}$ Create an everyday situation where this problem could represent a way to find the solution.	
5.NF.B.7c	Calculate the solution to the following problem. Use words, a picture, a number line, a math sentences or other math strategies to show the meaning of the solution. $\frac{3}{4} \times \frac{2}{3}$=?	
5.NF.B.8a	Create an everyday situation where this problem could be represented and find the solution. $\frac{1}{8} \div 24$ Calculation and interpretation may be supported by diagrams, models, or words.	

Grade 5 Mathematics

Code	Sample Stem	Explanation
5.NF.B.8b	Create an everyday situation where this problem could be represented and find the solution. $24 \div \frac{1}{8}$ Calculation and interpretation may be supported by diagrams, models, or words.	
5.RA.A.1a	Find the 6th number in both of the following numeric patterns. Pattern One starts at 3 and grows by adding 1 and pattern Two starts at 4 and grows by adding 3.	
5.RA.A.1b	Using the following two numeric patterns, translate the patterns into two sets of ordered pairs representing each pattern. Pattern One starts at 3 and grows by adding 1 and pattern Two starts at 4 and grows by adding 3.	
5.RA.A.1c	Graph both numeric patterns listed below on the Cartesian coordinate plane. Pattern One starts at 3 and grows by adding 1, so the first five ordered pairs would be (1, 3), (2, 4), (3, 5), (4, 6), (5, 7) and pattern Two starts at 5 and grows by adding 3, so the first five ordered pairs would be (1, 5), (2, 8), (3, 11), (4, 14), (5, 17).	

Grade 5 Mathematics

Code	Sample Stem	Explanation
5.RA.A.1d	Patti is looking at some patterns generated by connecting triangles and looking at the resulting perimeter as shown below.  Patti sees that she could describe the first pattern by the rule "Starting at 0, add 3" and the second pattern by the rule "Starting at 0, add 6". Use the figures or the rules to generate terms for each rule. How are the pattern values in one sequence changing compared to the corresponding pattern values in the other sequence? Explain this pattern informally.	
5.RA.A.2	Given the pattern 64, 32, 16… generate the rule.	
	Given the pattern $\frac{3}{4}, \frac{6}{4}, \frac{9}{4}, \frac{12}{4}$… generate the rule. How could the pattern be represented in a different way?	
5.RA.B.3	Identify which expressions are equivalent and are not equivalent to 20 + 3 and explain why A. 4 x (5+3) B. 4 x 5 +3 C. 4 x [5+3] D. (4 x 5)+3	
5.RA.B.4	John has some cookies. Gina has four fewer than John. Write an algebraic expression to represent the number of cookies John has.	
5.RA.C.5	Jameson completes $\frac{3}{4}$ of a 400-piece puzzle. Gabe completes $\frac{7}{8}$ of a 200-piece puzzle. Who has completed more of their puzzle? Use words, pictures, number lines, math sentences or other math strategies to justify which student has completed more.	

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Code	Sample Stem	Explanation
5.GM.A.1	Use attributes of the following geometric shapes to generate statements that are always true, sometimes true, or never true. Be sure to explain why your statement is correctly labeled. Shapes: Square, Rectangle, Parallelogram, Trapezoid, Rhombus, Kite. For example: A Square is a Rectangle. (Always True because squares have 4 90-degree angles and opposite sides are congruent).	
	List one attribute that each of the following pairs have in common: Square and Rhombus, Parallelogram and Quadrilateral, Rectangle and Square	
5.GM.A.2	Explain how a square is a rectangle, a rhombus, a parallelogram, quadrilateral, or polygon using words, drawings, or models.	
	Explain how a cube is a rectangular prism, a prism, and 3-D figure using words, drawings, or models.	
	Explain why (or why not) a square is included in the following categories: quadrilateral, triangle, rectangle, polygon, rhombus.	
5.GM.A.3	A prism and a pyramid have the same base. Which has more edges? How do you know?	
	Using the provided models of prisms and pyramids, compare (describing similarities and differences) using a Venn Diagram. Next as a team, using the new set of 3-D shapes and sort them into 3 categories: Prism, Pyramid, or Neither. When the group comes to a consensus, defend how you know the categories are correct.	Provide students with physical models of prisms and pyramids. Their focus should be on increasing understanding of vocabulary including Faces, Edges, Vertices, Bases, and Lateral Faces One option for the second part is to use a "silent teaching" approach, where each student chooses 1 shape and places it in one of the 3 areas. If a student sees one shape that is in the wrong category, he can get up (without talking) and move it to its correct spot.

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Code	Sample Stem	Explanation
5.GM.B.4a and 5.GM.B.4b	Using cm cubes and 1-inch cubes. Compare (describing similarities and differences) various prisms that have been provided. Predict the number of unit cubes needed to fill the prism. Then follow the same process with the additional prisms provided. Note 5.GM.B.4a and 5.GM.B.4b need to be together in most tasks. B.4b could be done separately, but B.4a needs a situation.	Students will need cm cubes and 1-inch cubes. They will also need a variety of prisms (be sure prisms match the manipulative cubes used) to explore filling with the unit cubes. Giving them the experience of the concept of volume will also show transitioning from linear and area 2-D measurement to 3-D measurement of volume. This would be a good place to discuss what things in real life are measured in cubic units (truck beds, freezer space, etc.) Could also ask students to visualize a cubic foot, cubic meter, etc. and ask when these would be appropriate units to use.
5.GM.B.4b	Use the grid provided and cut out each of the four corners by the same number of squares, e.g., 1x1, 2x2. Fold up each side to make an open-ended box. Make predictions which box will hold the most cubes. After making your predictions, fill each box with cm cubes. Compare your results with classmates and look for patterns in the results.	Students will need cm grid paper, cm cubes for filling their trays, scissors, and tape. Prepare centimeter grids copied on card stock paper (if possible) for each student. Have each student cut out a 12 × 12 square. Working in groups, have students cut out a different square section from each corner of his square (one cuts out a 1 x 1 section of each corner, another 2 × 2 section of each corner, another cuts a 3 × 3 section of each corner, etc.). Then students fold and tape the sides (grid side facing out) to make open boxes of various sizes. Have students predict whose box will hold the most cubes. Have students fill their boxes and record the number of cm cubes it took. Classroom discussions should include strategies used to determine the number of cubes. The goal will be for students to recognize that the number of cubes needed to cover up the base (first layer) multiplied by the number of layers will give them the total number needed to fill the box.

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Code	Sample Stem	Explanation
5.GM.B.5	Build a prism that is 4 cm tall, 3 cm wide, and 2 cm long. What is the volume of the prism? Build another prism with the same volume. What are the new figures' measurements?	Students will need manipulatives for this task, e.g., cm cubes.
	The volume of a rectangular prism is 24 cubic inches. Using 1-inch wooden cubes, build all the possible prisms with this volume. Record the dimensions of each prism. What pattern(s) do you notice?	Students will need 1-inch wooden cubes for this task.
5.GM.C.6a	Draw two number lines that perpendicularly intersect at each number line's zero. What would the intersection represent to this grid?	
	Consider the two situations listed below. For each of these situations, imagine handing one of your classmates a sheet of paper with a dot somewhere on the page. Their task will be to describe the dot's location. Situation one: the page is blank other than the dot. Situation two: the page contains a Cartesian coordinate system, and the dot is located at an intersection of grids on the coordinate system. Compare (describing similarities and differences) how your classmate might approach these two situations (to describe the dot's location).	Another option would be: Show an object on a blank sheet of paper and ask how one could describe its location to another person. Then place a horizontal number line underneath the image but not touching it. Repeat question about how to describe the image's location (i.e., The image is 8 units to the right of zero but above the 8). Finally, place a vertical number line perpendicular to the horizontal number line (with their zero-points matching) that is also left of the image. Repeat with the question of how one could describe the location of the image (i.e., the image is 8 units to the right of 0 on the horizontal number line and 2 units up from zero on the vertical number line. Overlay with a first quadrant grid. Ask students what they notice and wonder. Consider using a children's literature book, *The Fly on the Ceiling: a Math Myth* by Julie Glass, as a way to show the need for a coordinate system and to give background to how and why Descartes created the cartesian plane.

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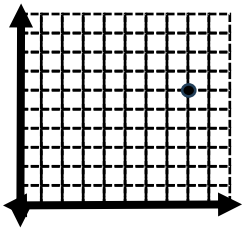
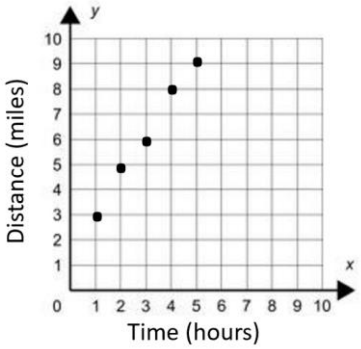
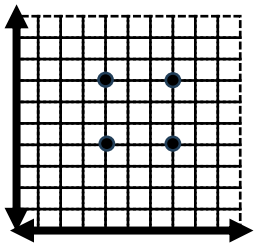
Code	Sample Stem	Explanation
5.GM.C.6b	The grid below has a point at (8, 6).  Describe what you notice and what do you wonder about that coordinate?	Note: 5.GM.C.6a-d are not in themselves good assessment items, but are foundational to 5.GM.C.7 when students apply their knowledge to solve problems within the first quadrant.
5.GM.C.6c	Explain the meaning of the first coordinate in an ordered pair.	
5.GM.C.6d	Explain the meaning of the second coordinate in an ordered pair.	
5.GM.C.7	Linda went for a hike. The graph below shows the distance she had hiked at various points in time.  How many hours did it take Linda to hike the first 5 miles? What ordered pair describes how many miles Linda hiked in 5 hours?	
	Below is a graph showing 4 points.  Identify each point using its ordered pair. What do we know about the 4 points on the Cartesian coordinate grid?	

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<table>
<tr><th>Code</th><th>Sample Stem</th><th>Explanation</th></tr>
<tr><td>5.GM.D.8</td><td>A pitcher contains 2 Liters of lemonade. If a glass can hold 250 milliliters, how many glasses can the pitcher of lemonade fill?</td><td></td></tr>
<tr><td>5.GM.D.9</td><td>Mr. Clark asked the students in his fourth-grade class to measure their heights. Here are the recorded heights of four of his students.

<table><tr><th>Student</th><th>Height</th></tr><tr><td>Renee</td><td>50 inches</td></tr><tr><td>Seth</td><td>$4\frac{1}{4}$ feet</td></tr><tr><td>Lynn</td><td>$1\frac{1}{2}$ yards</td></tr><tr><td>Rick</td><td>4 ft 4 in</td></tr></table>
List the four students from tallest to shortest.</td><td></td></tr>
<tr><td>5.DS.A.1</td><td>Predict why the water usage in the house increases at 5PM.</td><td></td></tr>
<tr><td rowspan="2">5.DS.A.2</td><td>Using data collected on the number of letters in students’ last names, create a line plot.

Record the following:
What conclusions can be drawn from the line plot?
What is the median average of letters?
What number of letters occurred the most?</td><td>Students can record the number of letters in their last name on a post-it note and place them on a displayed number line.

They can also act this out by forming a human line plot.</td></tr>
<tr><td>Below are the heights of fifth grade students in a class.

Create a line plot representing the height of the students. Use the line plot to describe how well the median for this set of data represents in the line plot.

Heights of the students measured as they were lined up: 4’ 7”, 4’ 9”, 4’ 8”, 4’ 8”, 4’ 9”, 4’ 8”, 4’ 10”, 4’ 11”, 5’ 6”, 4’ 5”, 4’ 7”, 4’ 7”, 4’ 9”</td><td></td></tr>
</table>